

The United States of America



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Therefore, this

United States Patent

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Nicholas P. Godici

Acting Director of the United States Patent and Trademark Office

Marcia L. Campbell-Jones

Attest

(12) **United States Patent**
Treece



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(54) **UNIVERSAL CEMENTING PLUG**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|-----------|---------|-----------------|---------|
| 3,605,896 | 9/1971 | Perkins | 166/290 |
| 3,616,850 | 11/1971 | Scott | 166/155 |
| 3,768,556 | 10/1973 | Baker | 166/154 |
| 3,768,562 | 10/1973 | Baker | 166/289 |
| 3,796,260 | 3/1974 | Bradley | 166/153 |
| 3,948,322 | 4/1976 | Baker | 166/289 |
| 4,246,967 | 1/1981 | Harris | 166/291 |
| 4,246,968 | 1/1981 | Jessup et al. | 166/334 |
| 4,624,312 | 11/1986 | McMullin | 166/155 |
| 4,836,279 | 6/1989 | Freeman | 166/153 |
| 4,858,687 | 8/1989 | Watson et al. | 166/153 |
| 4,934,452 | 6/1990 | Bradley | 166/153 |
| 5,095,980 | 3/1992 | Watson | 166/192 |
| 5,437,330 | 8/1995 | Gambertoglio | 166/289 |
| 5,533,570 | 7/1996 | Streich et al. | 166/153 |
| 5,722,491 | 3/1998 | Sullaway et al. | 166/291 |
| 5,813,457 | 9/1998 | Giroux et al. | 166/153 |

FOREIGN PATENT DOCUMENTS

0 371 576 A1 6/1990 (EP).

| | |
|--------------|---------------|
| 0 498 990 A1 | 8/1992 (EP). |
| 0 697 496 A2 | 2/1996 (EP). |
| 0 774 564 A2 | 5/1997 (EP). |
| 0 869 257 A2 | 10/1998 (EP). |
| 2 663 678 A1 | 12/1991 (FR). |

OTHER PUBLICATIONS

Halliburton Services Sales & Service Catalog No. 44, pp. 26-30 and 48-52 (1990).

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ABSTRACT

A cementing plug having a universal construction and improved wiping and extended wear characteristics. The cementing plug has a plug subassembly with a body member and an elastomeric jacket on the body member. The body member defines a central opening therethrough with a shoulder therein. To configure the plug as a bottom cementing plug, a shearable insert is positioned on the shoulder, and to configure the plug as a top cementing plug, a non-shearable insert is positioned on the shoulder. The shearable insert is one of a plurality of such inserts designed to shear at correspondingly different shear pressures. In a first embodiment, the shearable insert is a substantially flat disk having a uniform thickness, and in a second embodiment, the shearable insert has an outer ring portion and a relatively thin inner domed portion. Thus, a bottom plug may be pumped down a well casing with cement and a top plug thereabove so that when the bottom plug lands at the bottom of the casing, the shearable insert will shear at the predetermined pressure. The jacket has one or more wiper cups which have a conical surface extending at an acute angle with respect to a longitudinal axis of the plug, thereby providing a substantially large contact area in the well casing to improve wiping efficiency and extend life.

51 Claims, 2 Drawing Sheets

